

CLAIMS

1. A device for detecting whether or not a component holder is good, which comprises:

5 an illuminating device (120) for emitting light to the component holder (201) having a component hold face (140) with an area not smaller than a light reflection face (141) of a component (312);

10 an image-pickup device (106) for carrying out an image-pickup of the component hold face illuminated by the illumination of the illuminating device; and

15 a controller (150) for determining whether or not the component holder is good on a basis of a luminance of the component hold face in image-pickup information of the component hold face supplied from the image-pickup device.

2. The detecting device according to Claim 1, wherein the controller has a setting value (652) set on a basis of a total luminance by reflection from the component and the component hold face when the illuminating device emits light in a state with the component being held at the component hold face, so that determines that the component holder is defective when the luminance at the component hold face in a state without the component being held is not smaller than the setting value.

25 3. The detecting device according to Claim 2,

wherein the controller has region information related to a plurality of sections (611) obtained by dividing the component hold face and determines whether or not a luminance at each section is not smaller than the setting value.

4. The detecting device according to Claim 2, wherein, when the luminance is smaller than the setting value, the controller determines the component holder as defective if an image corresponding to the component is recognized within imaging information of the component hold face supplied from the image-pickup device.

5. The detecting device according to Claim 4, wherein the controller has information related to the image of the component recognized within the imaging information of the component hold face, the information related to the image being made image information of a size not larger than a minimum component to be held by the component holder.

6. The detecting device according to Claim 1, wherein the illuminating device emits light to the component holder by an amount of light for inspection which exceeds a maximum amount of light at a time when the illuminating device emits light to the component and the component hold face in a state with the component being held at the component hold face.

7. A method for detecting whether or not a

component holder is good, which comprises:

emitting light to a component holder (201) having a component hold face (140) of an area not smaller than a light reflection face (141) of a component (312);

5 carrying out of image-pickup of the illuminated component hold face; and

determining whether or not the component holder is good on a basis of a luminance of the component hold face in image-pickup information of the component hold face.

10 8. The detecting method according to Claim 7, wherein, when a setting value (652) is set on a basis of a total luminance by reflection from the component and the component hold face at a time when light is emitted to the component holder in a state with the component being held
15 at the component hold face, the component holder is determined as defective when the luminance at the component hold face in a state without the component being held is not smaller than the setting value.

9. The detecting method according to Claim 8,
20 wherein, when there is region information related to a plurality of sections (611) obtained by dividing the component hold face, it is determined whether or not the luminance is not smaller than the setting value for each section.

25 10. The detecting method according to Claim 8,

wherein, when the luminance is smaller than the setting value, the component holder is determined as defective when an image corresponding to the component is recognized within imaging information of the component hold face.

5 11. The detecting method according to Claim 10, wherein information related to the image of the component recognized within the imaging information of the component hold face is made image information of a size not larger than a minimum component to be held by the component holder.

10 12. The detecting method according to Claim 7, wherein light is emitted to the component holder by an amount of light for inspection which exceeds a maximum amount of light at a time when the component and the component hold face are illuminated in a state with the
15 component being held at the component hold face.

 13. A component mounting apparatus which comprises:

 a device (100) for detecting whether or not a component holder (201) is good which includes: an
20 illuminating device (120) for emitting light to the component holder having a component hold face (140) of an area not smaller than a light reflection face (141) of a component (312), an image-pickup device (106) for carrying out image-pickup of the component hold face illuminated by
25 the illuminating device, and a controller (150) for

determining whether or not the component holder is good on a basis of a luminance of the component hold face in imaging information of the component hold face supplied from the image-pickup device;

5 a component supply device (305) for supplying a component to be held by the component holder; and

 a component load and transfer device (200) with the component holder for holding the component from the component supply device with the component holder and
10 mounting the held component onto a circuit board (301).

14. The component mounting apparatus according to Claim 13, wherein the component load and transfer device has a detecting device supporter (117) with a plurality of the component holders arranged in an array for holding the
15 illuminating device and the image-pickup device disposed opposite to the component hold faces of the component holders and included in the detecting device, and a drive unit (111, 112, 115 and 116) for moving the detecting
device supporter in relation to the component holders along
20 an arrangement direction of the component holders.

15. The component mounting apparatus according to Claim 13, which further comprises a cleaning device (311) for cleaning a component hold face of a defective component holder determined as defective by the detecting
25 device.

16. The component mounting apparatus according to Claim 13, which further comprises a holder replacement device (310) for separating and holding a defective holder determined as defective by the detecting device from the component load and transfer device, and holding a spare component holder (313) for the component holder installed in the component load and transfer device.

17. The component mounting apparatus according to Claim 14, wherein the component load and transfer device further has driving parts for ascent and descent (204) installed corresponding to respective component holders for moving the component holders up and down, and a position detector (115, 116, 322 and 323) for detecting a position of the image-pickup device moved by the drive unit along the arrangement direction of the component holders,

the component mounting apparatus further having a trigger signal generator (321) for generating a trigger signal for moving down the component holders to the driving parts for ascent and descent,

so that the controller controls the driving parts for ascent and descent on a basis of the position of the image-pickup device by the position detector when the trigger signal is generated by the trigger signal generator.

18. The component mounting apparatus according to Claim 17, wherein the position detector has sensors for

detecting the position of the image-pickup device.

19. The component mounting apparatus according to Claim 17, wherein the position detector has a linear sensor (115) and a linear scale (116) arranged along the arrangement direction.

20. The component mounting apparatus according to Claim 19, wherein the controller uses an output signal of the linear sensor to control a timing of the image-pickup by the image-pickup device.

21. The component mounting apparatus according to Claim 17, wherein the controller stops an operation instruction to the driving parts for ascent and descent when it is determined on a basis of an output from the position detector that the image-pickup device and the component holder interfere with each other.

22. The component mounting apparatus according to Claim 21, wherein the controller carries out warning notification when generating the operation instruction for the stop.

23. A component mounting method, in which whether or not a component holder (201) is good is determined by carrying out a detecting method of determining whether or not the component holder is good on a basis of a luminance of a component hold face (140) in imaging information of the component hold face by emitting

light to the component holder having the component hold face of an area not smaller than a light reflection face (141) of a component (312) and carrying out image-pickup of the illuminated component hold face after a component mounting operation of holding a component (312) by the component holder (201) and mounting the component to a circuit board (301) is carried out by a set number of times before a next component mounting operation is started.

24. The component mounting method according to Claim 23, wherein a luminance reduction process is carried out to a component hold face of a defective component holder when the component holder is determined as defective by the detecting method.

25. The component mounting method according to Claim 23, wherein, in the component mounting operation when the components (312) are sucked to the component holders (201) by independently moving up and down a plurality of the component holders arranged linearly to each other, carried out the image-pickup of the components sucked by the component holders by an image-pickup device (106) by moving the image-pickup device from below the component holders along an arrangement direction of the component holders, and mounted to the circuit board (301) after the image-pickup,

25 a position of the image-pickup device with moving

is detected, so that the downward movement of the component holders is controlled on a basis of the detected position.